



Beta Delivery Status and Planning for V1

Jim Firestone and Barbara Putney

Science Software Transfer Group (SSTG)

MODIS SDST

MODIS Science Team - Programmer Forum

Nov. 14, 1995



S/W Transfer Lessons-Requirements

- The GSFC DAAC requires format descriptions for all files in the science code. SDST will need to provide a standard template to facilitate documentation of formats, and the SCFs will need to fill these out for each delivery.
- SSI&T requirements, e.g. those for test data and metadata, were not enumerated and frozen early enough in Beta to allow for full compliance by the SCFs and SDST.
- SCFs need to place more emphasis on documentation of their deliveries, including system-level documentation, which goes beyond the bare minimum required by ECS. SDST should define the extra documentation.
- An automated checker in V1 could reduce manual code checks while allowing customization to the ESDIS standards set.
- Beta identified the need for numerous utilities in V1 and V2, e.g. HDF analysis, product QA, and ancillary data.



S/W Transfer Lessons - Design

- ECS release of SDP TK V5 (esp. metadata features) and HDF prototype came too late to help in Beta. Not enough detail was given by ECS on their metadata approaches at an early enough stage to be useful in design of the MODIS API.
- L1B format: hyperslab reads, including all bands at once for each scan line, were much more efficient than single band reads because the Beta format is band by pixel interleaved. However, benchmark tests proved that the Beta format is not optimized for read access, and a reordering of arrays to a band by scan line structure would speed access considerably.
- Standard gridded ancillary products (e.g. NMC) are too coarse for providing accurate values at satellite pixels. Science software developers will need to provide routines which interpolate gridded ancillary data to satellite pixels.



S/W Transfer Lessons - Coding

- Science code should check for temporal matches between ancillary data and corresponding simulated data before processing proceeds.**
- Templates or wrappers for SDP tools and L1B reading are time savers and ease code maintenance.**
- A 5-10 day code turnaround cycle was often difficult in Beta. 15-25 calendar days is more practical when a large number of changes are needed in a given incremental delivery.**
- It is most efficient to have the CM receive only "final" deliveries and for the SSTG to manage incremental deliveries.**
- SDP TK automated response system allows up to 30 days for non-installation questions. In some cases this impacts code turnaround time. An urgency ranking and more timely feedback is needed for SDP TK usage problems.**



S/W Transfer Lessons - Programmer

- The SAIC Common Approach to S/W Development, used by SDST, was essential in catching errors in PDL and code early on in development.
- All Vdata rows in an HDF must be written with one call; multiple calls, one per field in the row, are not supported.
- The rank must be initialized before calling M-API's GMARDM, which retrieves an array's dimensionality information using the FORTRAN interface.
- The SGI cache design necessitates reading data as “slabs,” optimizing block sizes to minimize read/write cache conflicts, and ordering C arrays as (lines,bands,pixels) rather than (lines,pixels,bands).



S/W Transfer Lessons - Test

- The Beta simulated L1B data set is inadequate for oceans testing.
- Having knowledge of the tests performed on science code at the SCFs facilitates the testing done at the TLCF.



S/W Transfer Lessons - Communications

- More frequent technical interactions are needed between SSTG and SCF programmers and scientists. Possibilities include a listserv, newsletter, augmented WWW site, use of gsfc.modis newsgroup, regular telecons. Interactions as a group, not just SCFs individually with SDST, would ensure more consistency in knowledge base across SCFs.
- SDST needs to provide, early in V1, a single reference guide for SCF developers to include code standards/guidelines, relevant SDST processes (e.g. HDF spec. updating, code delivery), required elements of a delivery, SDST schedules.
- The MODIS anonymous FTP site must be under CM control. This includes directories for M-API release, ICD/HDF product specs., utility software, and data sets.



S/W Transfer Lessons - Comm. (cont.)

- O An equivalent to the MODLAND concept of a "Science Liaison" to SDST is beneficial for atmospheres and oceans.**
- O MODLAND meetings provided quantum leaps in progress and should be duplicated by the atmospheres and oceans groups.**
- O Face-to-face meetings with SCFs where appropriate, (e.g. the July 1995 visit to Miami oceans SCF) can promote rapid progress.**



S/W Transfer Lessons - Schedules

- Schedules for new software development (e.g. M-API) must include adequate time for unit and system testing, as well as QA functions (e.g. walkthroughs).
- The SCFs should continue to create and maintain schedules for their code deliveries, synchronized with SDST internal schedules. They should report deviations from established schedules to Ed Masuoka. The work done by the MODLAND group during Beta is a notable success in this area.



SCF Work Remaining for Beta

- Final concurrence on Beta HDF product specs. by SCFs.
- Obtain documentation from SCFs for ALL input, intermediate and temporary files used in deliveries (for Beta Processing Files Description document required by DAAC).
- Tolerances and Binary Information Files for each delivery.
- Verify accuracy of bubble charts and processing volumes and loads.
- Specify V1 utility and simulated/test/ancillary data requirements.



SDST Work Remaining for Beta

- Complete SDP, M-API/HDF, L1B tool incorporation, walkthroughs for L2G/L3 land (L2 complete), SeaWiFS-like oceans code, L2 atmospheres. All Beta transfer work should be complete in Dec. 1995.
- Completion of production scripts by SDST Integration staff.
- Testing of deliveries in threads by SDST Test Team.
- Installation and test in DAAC IR-1 environment beginning late Feb. 1996.
- Baseline of Beta Processing Files Description document.



Major Goals for Version 1

- Code meets all ESDIS and MODIS standards, and aims to meet guidelines.
- Code produces scientifically valid products.
- Create HDF file specs. using ECS structures (e.g. swath(and ECS Core Metadata.
- Use actual ancillary data, with primary and backup sources located and data links established. Ancillary data stored in HDF to extent possible.
- Processes run in at-launch threads to reflect actual dependencies.
- SCFs follow SDST processes for code acceptance, HDF spec. update, and code delivery.



Major Goals for V1, cont.

- Methods for regular communication and on-line access to shared information established. SCFs have access to information on, and gain understanding of, ECS requirements and system.
- Code and HDF specs. received in accordance with downstream dependencies.
- Requirements for V2 analysis tools (e.g. visualization) agreed upon early in V1.
- Optimize L1B file structure for reading by other processes.
- Code and toolkits able to run in 64-bit mode.
- Quality information (e.g. flags) included in V1 HDF specs.



SCF Involvement with SDST Processes



- Understand the SDST code development/walkthrough process and request participation in pre-walkthrough review of PDL and code as appropriate.
- Understand what constitutes a complete delivery to SDST.
- Understand roles of CM and CCB and how SCF interacts with them.
- Understand SDST Code Acceptance Process and standard delineation of SDST and SCF roles.



Datasets and Utilities Available Via FTP

- Cloud mask for sim. L1B - full res. and subsampled versions.
- Sim. L1B data - 3 orbits/36 bands in HDF out to 16 days; both subsampled and full res. versions.
- Global ocean cloud mask - Wisconsin/SSEC GAC and LAC versions.
- Land-water mask - 1 km. version from EDC.
- HDF file format descriptions - for all MODIS products.
- MODIS API - Ver. 1.2 available now; 1.3 expected 1/3/96.
- Land L2G/L3 utilities (Robert Wolfe).



MODIS Anonymous FTP ([ltpftp.gsfc.nasa.gov](ftp://ltpftp.gsfc.nasa.gov))

- /pub/projects/modis/CloudMask - GAC/LAC masks
- /pub/projects/modis/SDPTK.templates - C/FORTRAN templates for mandatory SDP tools
- /pub/projects/modis/hdf - HDF product descriptions (under CM)
- /pub/projects/modis/stig_temp/hdf - Working HDF specs. (not under CM)
- /pub/project/modis/icd - Interface Control Docs.
- /pub/projects/modis/modis_api - M-API lib. and docs.



Other Datasets at TLCF

- /STIGdata/LandSea_Mask - EDC 1 km. land-sea mask
- /STIGdata/16_Days/Cloud - Simulated 16-day cloud mask
- /STIGdata/16_Days/Geo_new - Simulated 16-day geolocation
- /STIGdata/16_Days/L1B - Simulated 16-day Level 1B
- /STIGdata/16_Days/L1Bsnowfire - Simulated 16-day Level 1B with snow and fire included



Handouts and Reference Material



- ESDIS/MODIS Standards & Guidelines - V1 edition
- Beta file descriptions received to date
- File descriptions template
- EOSDIS concept papers - swath , HDF-EOS library, metadata
- GSFC Data Assimilation Office (DAO) data summary
- Beta bubble diagrams (product inputs/outputs)
- MODIS Processing Volumes and Loads
- Additional SSI&T requirements - tolerances, etc.



Pertinent Web URLs

- EOSDIS Document Handling System - <http://edhs1.gsfc.nasa.gov/>
- EDC datasets home page - <http://sun1.cr.usgs.gov/doc/edchome/datasets/edcdata.html>
- ECS information for instrument teams - <http://ecsinfo.hitc.com/iteams/iteams.html>
- MODIS home page - <http://ltpwww.gsfc.nasa.gov/MODIS/MODIS.html>
- EOSDIS home page - http://spso.gsfc.nasa.gov/eos_homepage/servers/eosdis.html
- NCSA HDF ftp server - <http://ftp.ncsa.uiuc.edu/HDF>
- GSFC DAO home page - http://hera.gsfc.nasa.gov/dao.home_page.html



Configuration Management - Essential in V1

- The SDST CM - Jean Wilkins (modiscm@ltpmail.gsfc.nasa.gov)
 - interacts with SCFs to receive “final” deliveries (place in INBOX and send message to modiscm).
 - maintains FTP site, including HDF product specs., data sets, MODIS API releases, and announces new versions.
 - holds all code which has passed code acceptance process including walkthrough; makes code available to SDST Test Team on demand.
 - maintains agenda for SDST Configuration Control Board (CCB) meetings.
- The SDST CCB
 - acts on changes requested to baselined HDF product specs., SDST processes, SDST-provided software (e.g. M-API), production threads, and other configuration-related issues.



M-API Requirements

- Support for all SCF platforms (SGI, DEC Alpha, IBM RS/6000, Sun Sparc, HP).
- Support for both C and FORTRAN (ultimately FORTRAN-90).
- Support for 64-bit versions of SDP Toolkit and HDF.
- Support for all science data types, including unsigned integers.
- Support for major HDF data structures: arrays, tables, Vgroups, metadata (ECS Core and product-specific).
- Extract any portion of a MODIS L1-L4 HDF data file.
- Writes HDF file compatible with EOS tools and commercial s/w.
- Uses SDP Toolkit Status Message Facility (SMF) for error logging.



M-API Releases

- Draft User's Guide/Requirements document - 4/3/95
- 1.1 - 5/25/95 (C), 6/16/95 (FORTRAN)
 - HDF open/close, array I/O (SGI only).
- 1.1p1 - 8/14/95
 - supplement to 1.1 to provide unsigned integer support.
- 1.2 - 9/1/95
 - 1.1+1.1p1 ported to DEC Alpha, Sun Sparc, IBM RS/6000.
- 1.3 - scheduled 1/3/96
 - tables, file and array metadata stored as HDF attributes.
 - use of SDP Status Message Facility.



M-API Releases (cont.)

- 1.4 - scheduled 2/1/96
 - standard object names for all MODIS products.
- 2.0 - scheduled 6/7/96
 - Vgroups, HDF 4.0 support, ECS Core metadata.
- Beyond 2.0
 - 2-byte FORTRAN integers.
 - SDS objects located external to HDF files.



Components of a Complete Software Delivery to SDST

- Packing list showing all files delivered.
- Build/make file
- README containing: explanation of files, build/run instructions, test data results, description of tests run at SCF, how to modify environmental variables, explicit directory names in build file/PCF, which versions of M-API/HDF and SDP TK were used, name of system where runs were done and OS version, description of LUTs, ancillary and test data inputs, list of MODIS products input to the delivery.
- Code adhering to ESDIS/MODIS standards, including prologs. All output is sent to SMF log, not console.
- Updated byte-level descriptions of all input, intermediate, temporary, and output files using SDST templates.



Components of a Complete Software Delivery (cont.)



- Sample output of delivery, following HDF product specs.
- Delivery placed in INBOX on modis-xl.gsfc.nasa.gov.
- Message sent to modiscm@ltpmail.gsfc.nasa.gov.
- Code removed from OUTBOX when returned by SDST.



V1 Requirements Survey

- Please help SDST in meeting your data and software needs by providing us information on your V1 requirements.
- HDF or MODIS API capabilities:
- Ancillary data utilities and tools:
- Ancillary, test and simulated datasets:
- SDP Toolkit capabilities:
- Other data/software needs (specify):



MODIS Programmer's Forum Comment Form



- Please provide any comments or suggestions for SDST:



SCF-SDST Communications Survey

- As we begin development of the V1 system, SDST is looking for ways to improve communications with and between the SCFs. To help us weigh all the options, could you please indicate below which methods you would prefer. It may be beneficial to use more than one method depending on the group's preferences.
 1. Mailing list/listserv
 2. Usenet newgroup (gsfc.modis)
 3. WWW home page (Transfer Group page linked to SDST page)
 - Your browser client software:
 - Your platform/OS:
 4. Newsletter (monthly or bi-monthly) sent through e-mail
 5. Periodic telephone conferences
 6. Other (specify):



Proposed Web server contents

- Currently we are upgrading our S/W Transfer Group WWW page. We would like to include some or all of the following information on the Web site for your use. Please indicate the items you would like to see included.
 1. Personnel pictures, phone numbers
 2. Direct links to ECS documents - e.g. coding standards, SSI&T procedures.
 3. MODIS documents - e.g. coding standards, SDST processes, Beta Release Specification.
 4. Ancillary data specification information - including sample data.
 5. Information on MODIS API and other SDST utilities.
 6. Important dates/milestones related to deliveries.
 7. SDST schedules.



Proposed Web server contents (cont.)

- Additional items for inclusion:
 8. Links to MODIS FTP site.
 9. MODIS HDF product specs.
 10. Code Turnaround Status report.
 11. SPSO database for MODIS products.
 12. Meeting calendar.
 13. Current events in SDST (e.g. newsletter format).
 14. SSTG weekly status meeting report.
 15. Bubble charts (product inputs/output and dependencies).
 16. Slides from recent reviews/presentations at GSFC.
 17. Other (specify):